SCHEDULE 8

This is Schedule 8 comprising Construction Matters referred to in the Public Private Partnership Agreement for a twenty five year concession for a sustainable experience delivery programme between

The Department of Trade and Industry

and

Rainprop (Proprietary) Limited

SCHEDULE 8

Part 1: Planning/Consents

1. The Following are the planning consents and/or approvals which the Concessionaire shall obtain, and comply with as part of the design and construction of the Blocks, without prejudice to or derogation from the provisions of clause 15 [*Consents and Planning Approval*]:-

1.1 Site Development Plan Approval by the City Of **Tshwane**;

1.2 Building Plan Approval by the City Of **Tshwane**;

1.3 Approval for temporary road closure for Esselen Street;

1.4 Department of Water Affairs and Forestry's Approval For the Discharge of water into the Apies River;

1.5 Electrical Certificate; and

1.6 Occupational Certificate, to be issued by the City of **Tshwane**.

2. The Concessionaire shall provide the **dti** Representative with copies of the Consents or approvals or certificates, upon having obtained them.

SCHEDULE 8

Part 2: Safety During Construction

INTRODUCTION

1.1 All employees working on the JV Project are important, they are important to their Companies and to their families.

1.2 Every individual has the right to a safe and healthy working place and the right to return from work every day without injury.

1.3 This is the common goal to which the JV is committed and believes that it can only be achieved by a dedicated joint effort by all involved.

1.4 As the employer, the JV undertakes to provide a safe working environment with appropriate tools and relevant protective equipment. We also acknowledge that Health and Safety take precedence over programme and costs. The consequence of injury is financial loss to both the individual and to the JV Project.

1.5 The JV undertakes to audit this programme on a regular basis, this will ensure that a healthy and safe environment is maintained and employees are kept informed of any unsafe situations.

1.6 Each JV Project employee has the right and obligation to stop and correct an unsafe act or condition.

1.7 Definitions :

1.7.1 JV Project: Relates to the construction project undertaken by the relevant joint venture partners as detailed in the tender documents.

1.7.2 JV: Relates to the principal contractors detailed in the tender documents.

1.7.3 SHE: Safety, Health and Environment.

1.7.4 Construction Manager: The JV appointed responsible person in charge of construction.

1.7.5 SHE Officer: The JV appointed health and safety officer.

1.7.6 SHE Programme: The JV safety, health and environmental programme.

1.7.7 Contractor: Company (mandatory) appointed to conduct work by JV (Principal).

S.H.E MANAGEMENT PROGRAMME

2.1 The SHE Management Programme provides for a pro-active safety, health and environmental action plan, while taking into account the nature of the work, physical limitations and elements outside human control such as rain, hail and wind.

The main elements are:

1. Legislative and Contractual Requirements.
2. Responsibilities / Appointment structures.
3. SHE Representatives.
4. SHE Officer (Full Time).
5. SHE Meetings.
6. SHE Training.
7. SHE Inspections and Audits.
8. Accidents and Injuries.
9. Plant and Equipment.
10. Hazardous Chemical Substances (including soil contamination).
11. Personal Protective Equipment
12. Health and Hygiene.
13. Maintenance of SHE Systems
14. SHE Awareness
15. Contractors
16. General Site Safety.

2.2 Risk Assessments

2.2.1 Risk assessments will be conducted on all work activities.

2.2.2 The persons responsible for these risk assessments will be:

- JV Construction Manager.
- JV Construction Work Supervisors.
- JV SHE Officer.
- JV Subordinate Construction Work Supervisors.
- Employee Involvement.

2.2.3 Hazards identified in these risk assessments along with the preventative measures will be conveyed over to the workforce by means of induction sessions and regular toolbox talks.

2.2.4 Attached to this document is a guideline and example of the risk assessment process and procedure.This system will be implemented prior to construction activities taking place and will involve all specialised contractors.

2.2.5 Attached is a brief overall risk analysis of standard construction activities along with those tasks highlighted in the tender document. More in depth risk assessment will be drawn up on each individual task.

2.3 Safe Work Procedures

2.3.1 Work activities highlighted in the risk assessments as "High Risk" will require safe work procedures.

2.3.2 These safe work procedures will contain valuable information regarding the:

- Activity steps.
- Safety precautions.
- PPE required.
- Associated hazards.
- Documentation required.
- Safety equipment required.

2.3.3 These safe work procedures will be conveyed over to the workforce in Toolbox meetings and will be monitored and updated accordingly.

LEGISLATIVE AND CONTRACTURAL REQUIREMENTS

3.1 All local and National Legislative Requirements applicable to the SHE process of construction will be adhered to on the contract, namely and where applicable;

- OHS Act (85 of 1993)
- COID Act (61 of 1997)
- Any related legislation applicable to that industry or country.

3.2 All client safety standards and procedures will be adopted and incorporated into the project SHE Programme.

3.3 Where there is a discrepancy or conflict in any of the safety rules, the more stringent shall apply.

3.4 The JV will ensure that copies of all Legislative Requirements, Client Safety Standards and Procedures and the JV SHE Programme are available on site.

3.5 The JV will further enforce that all applicable Legislative Requirements and project standards are

adhered to by JV employees and Contractor employees.

3.6 The JV will adhere to all limitations and regulations regarding the contamination of soil and ground water as specified by the enviroment consultants and DWAF.

RESPONSIBILITIES AND APPOINTMENTS

4.1 The JV Construction Manager and Construction Work Supervisor will be made responsible to enforce all SHE standards. These designations will be done in writing and copies distributed

to all concerned. The designations are to ensure that all measures are taken to provide a safe and healthy working environment on the JV Project.

4.2 The responsibility of the JV Construction Manager and Construction Work Supervisors further includes:

4.2.1 Complying with the standards set by in the SHE Programme.

4.2.2 Evaluating the risks related to the activities of the employees and taking such steps as may be necessary to make such situations safe. Where this is not practicable, steps shall be taken to reduce the risks involved, including the provision of all necessary safety equipment and facilities.

4.2.3 Demonstrating management dedication and involvement in safety achievements.

4.2.4 Ensuring that safety targets are understood and achievable.

4.2.5 Preparing safety plans and procedures along with the JV SHE Officer before commencing work.

4.2.6 Promoting safety awareness.

4.2.7 Providing adequate safety training.

4.2.8 Using only people with adequate skills and experience.

4.2.9 Using only tools, materials and equipment which are adequate for the safe execution of the work and ensuring that they are maintained in good condition.

4.2.10 Erecting safety notices as required by the SHE Programme.

4.2.11 Attending safety meetings of the project.

4.2.12 Making all concerned aware of hazards in their working area.

4.2.13 Monitoring, investigating and reporting on safety incidents and implementing corrective action.

4.2.14 Preventing unsafe acts by employees and visitors to the project.

4.2.15 Applying work methods and procedures which are in accordance with internationally accepted safe working practices.

4.2.16 Taking disciplinary action where needed, especially against individuals who fail to adhere to the SHE Programme requirements.

4.2.17 Ensuring that safety regulations and procedures are clearly understood and communicated to all Contractors.

4.2.18 Ensuring that Contractors prepare their own Safety Plans and Procedures and that they comply with them.

4.2.19 Attending regular safety meetings with Contractors.

4.2.20 Arranging for the presence of essential fire equipment and the provision of medical services.

4.2.21 Arrangement for site emergency plans.

4.2.22 Allow access for regular testing of water samples as requested by the relevant authorities.

4.2.23 Carry out and record gas emission testing as demonstrated by the Engen representative with the equipment supplied to site.

4.3 Further to the above the JV Construction Manager will further designate responsible persons to assist and to conduct various activities in terms of the SHE Programme.

4.4 The JV Construction Manager will further appoint the following persons:

4.4.1 Construction Work Supervisors.

4.4.2 Subordinate Construction Work Supervisors.

4.4.3 Excavation Supervisors.

4.4.4 Scaffold Supervisors.

4.4.5 Explosive Powered Tool Supervisors.

4.4.6 Fire Equipment Supervisors.

4.4.7 First Aid Equipment Supervisors.

4.4.8 Ladder Supervisors.

4.4.9 Portable Electrical Equipment Supervisors.

4.4.10 Safety Belt Supervisors.

4.4.11 Electrical Supervisors.

4.4.12 Lifting Equipment Supervisors.

4.4.13 Workshop and Plant Supervisors.

4.4.14 Hazardous Chemical Substance Supervisors.

4.4.15 Stacking and Housekeeping Supervisors.

4.5 The appointment structure will be as per the staff organogram. These designations will not however relieve the JV Construction Manager of his overall appointed duties.

4.6 All designated appointments will be maintained and kept on file by the JV SHE Officer.

S.H.E REPRESENTATIVES

5.1 Each section crew will have an elected SHE Representative who will be designated in writing and who will have certain duties and functions. A minimum of 1 SHE Representative will be appointed per 50 employees. As in most cases each section crew will have an appointed SHE Representative.

5.2 The main functions of the SHE Representatives will be as follows:

5.2.1 Represent employees on SHE related matters.

5.2.2 Make recommendations to JV Project management on SHE related issues.

5.2.3 Be advised on and assist in formal inspections and audits.

5.2.4 Be advised on and assist in accident and incident investigations.

5.2.5 Form part of SHE Committees and attend formal meetings.

5.5.6 Conduct a formal monthly inspection, which must be submitted to the area Construction Work Supervisor for actioning.

5.3 SHE Representatives will not be victimised in any way and JV management will assist in ensuring that they are able to conduct their duties and functions.

5.4 All SHE Representatives will undergo a formal SHE Training Course.

5.5 All SHE Representatives will attend a monthly safety meeting with the JV SHE Officer, JV Construction Manager and relevant subordinate supervisors.

5.6 SHE Representatives who are elected will be full time employees and will be familiar with the construction activities.

5.7 SHE Representatives will be clearly identified with noticeable stickers on the side of their hard hats reading "SAFETY REPRESENTATIVE".

5.8 Contractors involved on the project will also be required to appoint SHE Representatives who will have the same duties and will also attend the JV Project SHE safety meetings.

S.H.E OFFICER

6.1 A full time SHE Officer will be appointed on the project. The JV will ensure that the SHE Officer has the necessary training and experience to conduct and co-ordinate the SHE activities.

6.2 The SHE Officer will report directly to the JV Construction Manager and will have the following co-ordination duties:

6.2.1 Conduct on site inductions.
6.2.2 Conduct regular inspections.
6.2.3 Conduct accident and incident investigations.
6.2.4 Assist that all legal and contractual requirements are met (documentation, signs etc.).
6.2.5 Co-ordinate all Contractor SHE related activities.
6.2.6 Co-ordinate SHE incentive schemes.
6.2.7 Compile and report on injury and incident statistics.
6.2.8 Co-ordinate all SHE meetings conducted on the JV Project.
6.2.9 Co-ordinate all maintenance systems related to SHE matters.
6.2.10 Co-ordinate all first aid and fire fighting equipment and emergency procedures.
6.2.11 Co-ordinate all SHE training on site.
6.2.12 Co-ordinate the monitoring of soil and water contamination.

6.3 The SHE Officer will have the authority to stop any unsafe activity or condition and when doing so provide the individual or supervisor with a non-conformance report.

6.4 Copies of all non-conformance reports will be handed over to the relevant Construction Work Supervisor and JV Construction Manager for their actioning.

6.5 The SHE Officer will be clearly identified with hard hat stickers which will read "SAFETY OFFICER".

S.H.E MEETINGS

7.1 The following SHE Meetings will take place on the JV Project:

7.1.1 JV Project Weekly Supervisors SHE Meeting.

This meeting will consist of the JV Construction Manager, all appointed JV Construction Work Supervisors, and the JV SHE Officer.

7.1.2 JV Project Monthly SHE Representative Meeting.

This meeting will consist of the JV Construction Manager, JV SHE Officer, and all appointed JV SHE Representatives and appointed Contractor SHE Representatives.

7.1.3 JV Project Monthly SHE Contractors Supervisor Meeting. (Subcontractor meeting)

This meeting will consist of the JV Construction Manager, JV SHE Officer, and all senior Contractor Supervisors appointed in terms of GSR11(1).

7.2 All meetings will be compulsory and all members will be appointed in writing.

7.3 Contractors who fail to attend the monthly supervisors meeting will be fined accordingly.

7.4 The weekly JV Supervisors Meeting will be a brief meeting. All relevant key issues raised will be recorded down by the JV SHE Officer and actioned by the relevant Construction Work Supervisors.

7.5 Formal minutes will be kept for the two remaining meetings and copies will be distributed to all concerned.

7.6 All minutes will be co-ordinated and kept on file by the JV SHE Officer.

TRAINING

8.1 Inductions

8.1.1 All JV Project employees and Contractor employees will undergo a formal SHE induction session before entering onto site.

8.1.2 Visitors who frequent the project on a regular basis will also be required to undergo the SHE induction.

8.1.3 Non regular visitors on a managerial or supervisory level will be informed of the dangers in a general SHE pamphlet.

8.1.4 The JV SHE Officer will co-ordinate and conducts all inductions.

8.2 Toolbox Talks

8.2.1 All employees will undergo a formal Toolbox Talk on a weekly basis.

8.2.2 These Toolbox Talks will cover a wide variety of topics and will be conducted by either the JV SHE Officer the designated Construction Work Supervisors or the relevant supervisors.

8.2.3 Employees who undergo these talks will be required to sign attendance registers as proof of the talks being held.

8.2.4 The JV SHE Officer will co-ordinate the Toolbox Talk topics.

8.2.5 All Contractors will be responsible for conducting their own talks but will however be assisted and guided by the JV SHE Officer.

8.3 First Aid Training

8.3.1 A minimum of one employee per 50 will be trained in first aid.

8.3.2 The JV will ensure that sufficient trained first aiders are available on site.

8.3.2 As the contract progresses additional first aid courses will be conducted.

8.4 SHE Representative Training.

8.4.1 All appointed SHE Representatives will be trained in SHE related matters.

8.4.2 The course will outline their basic functions and duties and will concentrate on SHE identification.

8.5 Further SHE Training which has been identified and which will be addressed will be:

8.5.1 Lifting Equipment Operators.

8.5.2 Explosive Powered Tool Operators.

8.5.3 Scaffold Erection.

8.5.4 Dumper Operators.

8.5.5 Rigging and Slinging.

8.5.6 Machinery / Plant Operators and Drivers.

8.5.7 Batching Plant Operators.

8.5.8 Supervisory SHE training

8.6 The JV will ensure that no employees conduct hazardous tasks without the necessary training and authority. This issue will further be highlighted in Safe Work Procedures which ensures worker training.

8.7 Certificates of training will be kept on file by the JV SHE Officer.

INSPECTIONS AND AUDITS

9.1 The JV SHE Officer will be responsible for conducting daily inspections, issues raised will be addressed with the appropriate employees and supervisors.

9.2 The JV SHE Officer will also be responsible for conducting a formal monthly SHE inspection. The findings of this inspection will be handed over to the JV Construction Manager for actioning.

9.3 The monthly inspection report will form part of an audit to ensure compliance with all legal and SHE Programme requirements.

9.4 Should the need arise external auditors will be utilised to audit the SHE Programme and site conditions. The Group Safety Manager will also visit the site from time to time and will further conduct audits to ensure compliance.

9.5 SHE Representatives will be required to conduct monthly inspections which in turn will be submitted to the designated JV Construction Work Supervisors for actioning. These reports will also be tabled at monthly SHE Representative meetings.

9.6 All inspections and audits will include Contractor activities.

9.7 Non-conformance reports will be issued to individuals, supervisors and Contractors who do not comply to the basic SHE Programme.

9.8 Where necessary disciplinary action will be taken against individuals for serious and repeat offences.

9.9 Should the JV Project Management agree that certain individuals or Contractors are continuing to conduct unsafe acts or activities, those individuals and or Contractors will then be requested to leave the Project permanently.

9.10 The JV SHE Officer will audit the contamination tests carried out on site.

9.11 The JV SHE Officer will co-ordinate and keep on record all inspections and audits.

ACCIDENTS AND INJURIES

10.1 Emergency Procedure

10.1.1 A formal emergency procedure will be adopted by the JV SHE Officer and JV Construction Manager. This emergency procedure will be based around the standard procedure but will be site and area specific.

10.1.2 The emergency procedure will be displayed in all prominent areas and will be communicated to all employees in the SHE induction sessions.

10.1.3 Emergency contact numbers will form part of the information on the emergency procedure.

10.1.4 Emergency Procedure plans will be discussed with all local Emergency Service Providers and mock test sessions will also be conducted on a regular basis.

10.1.5 Emergency assembly points will be identified and clearly labelled as such.

10.2 First Aid

10.2.1 First aid facilities will be provided and the location points clearly identified. First aid equipment will be continually updated and replaced.

10.2.2 All first aid treatments will be recorded onto registers.

10.2.3 First aid facilities will be under the supervision of a trained First Aider who will conduct monthly inspections on all first aid equipment.

10.3 Work Related Injuries

10.3.1 Injuries which require medical treatment from either a doctor or hospital will be properly recorded and investigated. The relevant investigative forms can be found in the SHE Procedure Manual.

10.3.2 The investigation will be conducted by the JV SHE Officer, area supervisor and SHE Representative. Findings of the investigation will be forwarded onto the relevant Construction Work Supervisors and JV Construction Manager.

10.3.3 All medical injuries will be discussed in the SHE meetings and recommendations implemented.

10.4 All injuries and incidents will be reported to the JV SHE Officer who will in turn be responsible for compiling the projects injury statistics.

10.5 All Contractors will be required to submit their manhours and injury figures to the JV SHE Officer who will include them in the overall project figures.

10.6 Employees will be encouraged to reduce injury ratings by JV implementing incentive schemes.

10.7 A JV Project injury board will be displayed at the entrance. This board will indicate the number of manhours worked, the number of injuries sustained, the project LTIFR, and details of recent incidents and details of the current safety topic.

10.8 All investigation reports will be copied and conveyed over to the Client's representative on site.

PLANT AND MACHINERY

11.1 The JV will ensure that all plant and machinery utilised on the project meets with all required safety standards.

11.2 All plant and equipment will be checked and inspected by the designated Plant Workshop Supervisor before starting on the project.

11.3 Operators / Drivers

11.3.1 The JV will ensure that no plant or machinery is operated by untrained or unauthorised operators.

11.3.2 Where required such as lifting equipment, operator certificates will be kept on file by the JV SHE Officer.

11.3.3 All plant and machinery operators will further undergo specific Toolbox Talks and will sign appointments designating them as operators.

11.3.4 Where required, drivers will be licensed according to the plant item they are utilising.

11.4 Pre-Start Checks

11.4.1 All operators and drivers will be required to conduct pre-start checks before commencing each shift.

11.4.2 Problems raised in these pre-start checks will then be raised with the appropriate Construction Work Supervisors and Plant Workshop Supervisor..

11.5 Maintenance

11.5.1 All maintenance will be undertaken by trained and authorised maintenance personnel who will be under the control and supervision of the Plant Workshop Supervisor.

11.5.2 Maintenance work will not be conducted in environmentally sensitive areas where pollution hazards might occur.

11.5.3 Adequate maintenance facilities will be erected in the form of workshops, tyre bays, wash bays, part storerooms and offices.

11.5.4 Oils, fuels and other lubricants will be strictly controlled and precautions will be taken to prevent spills.

11.5.5 Plant and machinery will be maintained according to the equipment's service requirements.

11.5.6 All service records will be maintained and kept on file by the Plant Workshop Supervisor.

11.6 Large earthmoving machinery will have the right of way on the contract and this will be conveyed to all persons during the induction sessions.

11.7 All local road laws will be applicable to all drivers entering onto site.

11.8 Speed limits will be identified and the appropriate signage erected.

11.9 The JV will further ensure that all machine guards are in place protecting employees from revolving or moving machinery.

11.10 Large earthmoving equipment will be equipped with reverse hooters, revolving warning lights and will operate with headlights on.

11.11 Lifting Machinery

11.11.1 These involve tower cranes, self-erecting tower cranes, mobile cranes and overhead gantry cranes.

11.11.2 Only authorised and trained operators will operate lifting machines. Certificates of the operators will be kept on site by the JV SHE Officer.

11.11.3 All lifting machines will be inspected by a competent person of an approved organisation every twelve months.

11.11.4 All ropes, chains, hooks, attaching devices, sheaves, brakes, and safety devices which form an integral part of the lifting machine will also be examined at six monthly intervals.

11.11.5 A copy of the last test inspection of the lifting machine will be kept on site.

11.11.6 The maximum load (MML) will be clearly visible on all lifting machines.

11.11.7 Cranes will be fitted with a device to prevent the highest or lowest hoisting position from being exceeded along with a warning device to prevent overloading.

11.11.8 The cranes will have a brake or safety device capable of containing the maximum load in the event of a power failure.

11.11.9 Tower Cranes

- Stop blocks will be fitted on all tower crane tracks.
- Ground area around the tower crane base will be sufficiently demarcated and fenced off.
- Danger warning signs will be placed near the lower end of the tower crane.
- A small fire extinguisher will be placed in the cabin of the tower crane.
- Suitable communication (two way radio) will be provided between riggers and operators.

11.11.10 Mobile Cranes

- Outriggers will be used and placed firmly on support blocks when lifting material.
- It is essential that the mobile crane is level when lifting material.
- Mobile cranes will move around site at safe speeds.

11.11.11 General Safety

- All lifting hooks will have a safety latch attached to prevent lifting tackle from slipping out.
- Under no circumstances will any worker be lifted up in any device unless the device (cradle) has been approved by an Engineer and Inspector from the Department of Labour.
- Where possible, material being lifted will be kept just off the ground and not above workers.
- Trained riggers will be identified with reflective vests and will be provided for lifting operations.
- Material being lowered will be placed down on adequate supports or spacers.
- Cranes will be fitted with warning hoots for operators.
- Areas where cranes are being used will be designated as hard hat areas.

11.12 Site Workshops

11.12.1 These workshops will be kept clean at all times and all excess oils, lubricants, and other consumables will be properly stored, stacked, contained and disposed of in accordance with the relevant regulations.

11.12.2 Tyres will be stored in such a manner that they cannot roll away or be bumped over.

11.12.3 A minimum of one 9Kg dry powder fire extinguisher will be erected with the appropriate signs.

11.12.4 Bench grinders will be securely fixed, they will have a protective screen (guard), and the rest plate will not be more that 3mm from the grinding wheel disk.

11.12.5 An "eye" protection mandatory sign will be placed above the bench grinder.

11.12.6 Overhead lifting gantry blocks, lifting jacks and trestles will have the SWL clearly identified.

11.12.7 Oxygen and Acetylene gas bottles will be secured in an upright position.

11.12.8 All cutting torch set's will be fitted with flashback arrestors on torch end and cylinder end.

11.13 Batch Plants and Concrete Mixers

11.13.1 Concrete batching plants will be erected according to the design and under the direct supervision of a competent person.

11.13.2 All moving and revolving machinery will be adequately guarded. These include motorised pulley belts, cables and cable drums.

11.13.3 The area around the main collective mixing skip will be kept closed off and under no circumstances will any worker enter this area while the batching plant is operational.

11.13.4 Control panels and switches will be clearly labelled and all wiring protected and stored neatly away.

11.13.5 Test certificates for compressors will also be kept by the JV SHE Officer.

11.13.6 If there is a large volume of traffic passing the open ends of the skip bins the area will be demarcated and a sign indicating "Beware Of Swinging Bucket" erected.

11.13.7 Ladders will be secured and handrails present on all working platforms.

11.13.8 Good housekeeping in and around batch plants will be maintained at all times.

11.13.9 Operators and other assistants will be issued with dust masks in windy and dusty conditions.

11.13.10 Only authorised and trained operators will operate batch plants and this includes small concrete mixing machines.

11.13.11 Only authorised persons will carry out repairs or maintenance on batching plants or concrete mixers.

11.13.12 A minimum of one 9Kg fire extinguisher with relevant signs will be erected at a batch plant.

11.13.13 All members of the batching crews will undergo Toolbox Talks and the relevant lock out procedures explained to them.

11.14 Site Vehicles

11.14.1 This includes the following items such as, site LDV's, TLB's, tipper trucks, concrete trucks, bob-cats, earthmoving equipment, teleports, and other vehicles.

11.14.2 Only authorised operators will be allowed to operate these vehicles and the Plant Workshop Supervisor can be consulted with regards to certifying operators, this includes hired machinery and plant.

11.14.3 Under no circumstances will workers be allowed to hang on the sides of any vehicles or plant. Workers may only be accommodated where a seat has been provided.

11.14.4 It will be made clear to all operators and drivers that they are and will be held responsible for any passengers which they might convey.

11.14.5 Vehicles which have been provided for the transportation of workers will not be over crowded with workers.

11.14.6 The transportation of workers and material on the same vehicle will be avoided and should this not be possible then the material will be properly secured.

11.14.7 Vehicles and plant will not be left unattended while the engine is running.

11.14.8 Keys will be removed from vehicles when parked.

HAZARDOUS CHEMICAL SUBSTANCES

12.1 All hazardous chemical substances used on the project will be listed and the Material Safety Data Sheets kept on register.

12.2 Material Safety Data Sheets will be controlled by the JV SHE Officer.

12.3 Employees utilising hazardous chemical substances will be provided with adequate PPE and informed of the dangers and preventative measures.

12.4 All hazardous chemicals will be clearly labelled along with the hazards and preventative measures associated with that substance.

12.5 Flammable Liquids

12.5.1 Flammable liquids stored in large amounts will be kept separately in suitable well ventilated areas.

12.5.2 Suitable fire fighting equipment will be provided at all flammable liquid storage areas.

12.5.3 No smoking and no naked flame signs will also be erected at all flammable liquid storage areas.

12.5.4 Large tanks storing fuel will be equipped with fire bund walls which will be able to hold 100% of the volume plus 10 %.

12.6 Waste Water and Sewerage

12.6.1 As per contract requirements, ablutions, washing up facilities and kitchens will be provided on the contract.

12.6.2 All waste water and sewerage will be controlled in such a manner that it will not create an environmental hazard.

12.6.3 Waste water from ablutions, washing up facilities and kitchens will be piped accordingly and connected into the appropriate service lines provided.

12.6.4 Sewerage from ablutions will be piped accordingly and connected into the appropriate service lines.

12.6.5 Should no service lines be available then all drainage will be led into an appropriate "french drain", septic tank or similar system, as per the specifications required.

12.6.6 All connections surrounding waste water and sewerage will be carried out by competent personnel so as to minimize the risk of leakage and blockages as a result of poor workmanship.

12.6.7 Should the need arise, mobile ablutions will be provided and will be serviced periodically as per the site requirements.

12.6.8 All ablution facilities erected will be positioned in such a manner that should any run off occur that the impact will not effect any environmentally sensitive areas such as vlei's and dams etc.

12.6.9 Where required notices informing and warning workers of certain "Do's and Don'ts" will also be provided.

12.6.10 All underground service lines will also be clearly identified so as to ensure that they are not damaged by any earthmoving activities.

12.6.11 Every attempt will be made by contract personnel to limit and reduce any environmental hazard associated with waste water and sewerage.

12.6.12 Issues surrounding waste water and sewage will be conveyed over to the workforce by means of Toolbox Talks.

12.7 Solid Waste

12.7.1 As per contract requirements, all solid waste will be identified, collected, stored and removed from the premises accordingly.

12.7.2 Excess and unused material will be cleaned up and placed in designated areas where they will be removed on a regular basis.

12.7.3 The areas where excess materials are stored will be demarcated accordingly with the appropriate signage.

12.7.4 Where possible large waste bins will be provided for easier removal.

12.7.5 Waste bins will be provided in all relevant areas such as offices, stores, ablutions, kitchens and on site.

12.7.6 All waste bins will also be demarcated and clearly identified as rubble and waste bins.

12.7.7 Individuals and specific contractors will be appointed for the regular removal of all solid waste.

12.7.8 Where possible solid waste such as wood, steel, glass and plastic will be removed by contractors for the purpose of recycling.

12.8 Hazardous Waste Inventory

12.8.1 All chemicals and materials which are classified as hazardous waste will be disposed of accordingly.

12.8.2 Chemicals and materials which fall into this class will be listed onto the inventory list.

12.8.3 Information regarding their disposal can be acquired on the Material Safety Data Sheets.

12.8.4 All lists of all Material Safety Data Sheets will be kept on file on site.

12.9 Hazardous Waste Storage

12.9.1 Hazardous waste which is used on the contract will be stored accordingly.

12.9.2 These chemicals and materials will be clearly identified and only placed in designated areas.

12.9.3 The classification of the hazardous waste will be determined by the Material Safety Data Sheets.

12.9.4 As with inventory list the storage facilities will be based upon the chemical or material having the following properties:

- Flammable, explosive, oxidising, corrosive, poisonous, radio active, harmful irritant and whether it is habit forming.

12.9.5 All necessary personal protective equipment (PPE) will be issued to individuals who are involved in the use and storage of hazardous waste.

12.9.6 The appropriate warning signs will also be erected where the hazardous materials are being stored.

12.9.7 Employees involved with hazardous waste will also undergo regular Toolbox Talks in the aim of maintaining safety awareness.

12.10 Site Soil and Water Contamination

12.10.1 Testing of gas emissions and water samples will be carried out on site by skilled personnel and data kept on these tests.

12.10.2 The site sub-surface drainage system has been designed in such a way that ground water samples can be taken after construction is complete.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

13.1 Wherever possible the JV will ensure that all risks associated with a task are minimised to the maximum before issuing PPE.

13.2 Standard PPE items which will be issued to workers as per company agreements and policies:

13.2.1 Hard hats, safety boots and overalls.

13.3 All other remaining PPE issue will be determined as per the risk assessments and safe work procedures.

13.4 PPE issued to employees will be signed for by the relevant individual and the records kept on file.

13.5 All PPE issues will be free of charge except in the cases of deliberate neglect or misuse.

13.6 PPE which is damaged due to wear and tear will be exchanged at the stores provided that the old damaged equipment is returned.

13.7 Sufficient stocks of PPE will be stored to prevent shortages.

13.8 Disciplinary action will be taken against individuals who do not use or misuse the PPE provided to them.

13.9 All relevant PPE mandatory signage will be erected in the appropriate designated areas.

13.10 PPE will be discussed with all employees in the Induction and Toolbox Talk sessions. These discussions will include the correct use of PPE.

HEALTH AND HYGIENE

14.1 Ablutions

14.1.1 The JV will ensure that suitable and adequate ablution facilities are made available for all JV Project employees.

14.1.2 A minimum of 1 toilet per 30 employees will be provided with suitable running water and toilet paper will be made available.

14.1.3 Ablutions will be placed in suitable areas and will be cleaned on a regular basis.

14.1.4 Portable toilets will be maintained according to the Project requirements.

14.1.5 Plumbing for ablution facilities will be conducted according to acceptable standards and legal requirements.

14.2 Wash Up / Drinking Facilities

14.2.1 Certain wash up facilities will be provided on site for individuals who require them.

14.2.2 Soap will be provided at these facilities.

14.2.3 Drinking water points will be made available in suitable areas and these water points will be identified as safe drinking water points.

14.3 Change Room / Dinning Facilities

14.3.1 Where required change room facilities will be erected for employees who require them.

14.3.2 Eating facilities will be erected in suitable areas around the Project site.

14.4 Suitable rubble and waste bins will be clearly identified and placed in suitable areas. These bins will be cleaned on a regular basis as per the Project requirements.

14.5 Health and hygiene will be promoted as part of the SHE Awareness Campaign.

14.6 In addition to promoting general health and hygiene the following health items will also be promoted:

14.6.1 AIDS Programme

- Education, training and information.

14.7 All health and hygiene matters will be monitored and co-ordinated by the JV SHE Officer.

S.H.E. AWARENESS

15.1 The Awareness Campaign will form the basis of the SHE Programme. The more employees are exposed to safety, health and environmental issues the greater the reduction in injuries and incidents.

15.2 Safety Signage

15.2.1 All basic safety signage will be erected at all entrances and will include messages such as:

- Danger Construction Site.
- No Unauthorised Entry.
- Visitors to report to Site Offices.
- Mandatory PPE signage (hard hats, boots, etc).

15.2.2 All mandatory PPE and other related mandatory signage will be erected in the appropriate areas.

15.2.3 Warning signs will further be erected in the appropriate areas.

- Warning of dangers above.
- Warning of excavations.
- Warning of possible hazards in the area.
- Speed limits.

15.2.4 Information signs will be erected and will advise employees and visitors on basic information such as:

- Location of fire fighting equipment.
- Location of first aid equipment.
- General Do's and Don'ts.

5.3 Posters

15.3.1 The JV will provide general SHE related posters which will be displayed in prominent areas.

15.3.2 The information on the posters will involve the following topics:

- General Do's and Don'ts.
- Scaffolding.
- Excavations.
- Barricading.
- Working with electrical tools.
- Health and hygiene.
- AIDS Awareness.
- PPE.
- General construction safety.

15.4 Incentive Schemes

15.4.1 An internal SHE competition will be held amongst the different sections and amongst the various Contractors.

15.4.2 Prizes will be awarded to all employees of the winning sections and winning Contractors.

15.4.3 The competition will be judged according to compliance of the SHE Programme and will be
co-ordinated by the JV SHE Officer.

15.4.4 JV SHE Officer will have at his disposal various promotional items such as hats, mugs, T-shirts, ect, which will be handed to employees who are noted in promoting safety awareness and who are setting examples in conducting work activities safely.

15.5 Suggestion Scheme

15.5.1 A SHE Suggestion Scheme will be implemented whereby employees will be able to contribute towards SHE related matters.

15.5.2 A SHE Suggestion Box will be implemented and entries will be considered on a monthly basis.

15.5.3 Employees who's suggestions are chosen will receive promotional items.

15.6 All awareness campaigns will be monitored and co-ordinated by the JV SHE Officer.

MAINTENANCE OF S.H.E SYSTEMS

16.1 All SHE related equipment, and other hazardous high risk equipment will be maintained according to local Legislation and the SHE Programme.

16.2 Employees who are designated responsible for certain items will be responsible to ensure that they are maintained and inspected accordingly.

16.3 The following SHE Elements will be inspected accordingly and the findings recorded:

☐	As required	-	First Aid Treatment Registers.
☐	As required	-	Plant Service / Maintenance Records.
☐	Daily	-	Plant Pre Start Checks
☐	Daily	-	Excavations.
☐	Weekly	-	Scaffolding.
☐	Weekly	-	Explosive Powered Tools.
☐	Monthly	-	First Aid Equipment.
☐	Monthly	-	Fire Fighting Equipment.
☐	Monthly	-	Ladders.
☐	Monthly	-	Portable Electrical Tools.
☐	Monthly	-	Safety Belts.
☐	Monthly	-	Air Compressors.
☐	Monthly	-	Small Hand Tool Spot Checks.
☐	Monthly	-	Flame Cutting Devices / Welding.
☐	Monthly	-	SHE Representative Reports.
☐	Monthly	-	SHE Officer Inspection Report.
☐	Monthly	-	Lifting Tackle.
☐	6 Monthly	-	Lifting Machinery Attachments.
☐	12 Monthly	-	Lifting Machinery.

16.4 The JV SHE Officer will be responsible to co-ordinate the maintenance of the SHE system. Designated employees who do not comply to the SHE Maintenance Programme will be reported to the JV Construction Manager.

16.5 Problems which are highlighted during these inspections must be reported to the following:

- The JV SHE Officer.
- The JV Construction Work Supervisor.
- The JV Construction Manager.
- The JV Plant Workshop Supervisor.

16.6 All Contractors will be required to maintain their own equipment and this will be audited by the JV SHE Officer.

CONTRACTORS

17.1 Despite Contractors being involved on the contract, The JV being the principle contractor will remain responsible and accountable for all Contractors acts and omissions, unless the following can be proved:

- The JV had a written SHE Agreement in place.

- The JV informed the Contractor and took all reasonable precautions to prevent the incident.
- The Contractor acted without connivance or permission by the JV .
- The Contractor conducted the activity which was not within the scope of authority of the Contractor.

17.2 All Contractors will therefore sign and submit the following documents before work commences:

17.2.1 Mandatory SHE Agreement with the JV.

17.2.2 Proof of registration with the local Compensation Commission (Department of Labour).

17.2.3 Appointment form for their designated Construction Work Supervisor.

17.2.4 Proof of induction of all their employees.

17.2.5 Risk Assessments and Safe Work Procedures.

17.3 Contractors main supervisors (Construction Work Supervisor) will be required to attend a formal monthly SHE meeting.

17.4 All contractor activities will form part of SHE inspections and audits by the JV SHE Officer.

17.5 Non-conformance reports will also be issued to Contractors who fail to comply to the SHE Programme.

17.6 Payments will be withheld for Contractors who fail to rectify non-conformance reports.

17.7 Contractors with more than 20 employees will be required to appoint SHE Representatives who will have the same duties as the JV SHE Representatives, namely:

- Represent employees on SHE related matters.
- Make recommendations on SHE related matters.
- Assist in formal inspections and audits.
- Assist in formal accident investigations.
- Form part of JV SHE Representative Committees (monthly meetings).
- Conduct formal monthly inspections and submit to Construction Work Supervisor.

17.8 Contractors will be included in all on site SHE training programmes.

17.9 Contractors will be included in all SHE safety competitions and will be requested to promote SHE Awareness amongst all employees.

17.10 All Contractors will receive a document concerning general site safety rules and regulations.

7.11 The JV SHE Officer will monitor and co-ordinate all Contractor SHE activities and report violations directly to the JV Construction Work Supervisors and JV Construction Manager.

This section gives brief guidelines for the use, care and maintenance of certain equipment.

It also gives brief guidelines on general safety principles which are to be adhered to while carrying out construction work. For the full legislative requirements please refer to the applicable Regulation in the applicable Act.

18.1 SITE ESTABLISHMENT

18.2 STORAGE AND LAY DOWN AREAS

18.3 FIRE PREVENTION AND PROTECTION

18.4 USE AND STORAGE OF FLAMMABLE LIQUIDS

18.5 EXCAVATIONS

18.6 DEMOLITION

18.7 WORK IN CONFINED SPACES

18.8 ROOF WORK

18.9 WELDING AND FLAME CUTTING

18.10 GAS BOTTLE SAFETY

18.11 LADDERS

18.12 RAMPS AND GANGWAYS

18.13 SCAFFOLDING

18.14 EXPLOSIVE POWERED TOOLS

18.15 PORTABLE ELECTRICAL EQUIPMENT

18.16 LIFTING MACHINES

18.17 LIFTING TACKLE

18.18 BUILDER'S HOIST

18.19 VESSELS UNDER PRESSURE

18.20 ELECTRICAL DISTRIBUTION BOARDS

18.21 ENVIRONMENTAL REGULATIONS AND SITE CONTAMINATION ISSUES

18.22 FACILITIES REGULATIONS

18.23 PERSONAL PROTECTIVE EQUIPMENT

18.1 SITE ESTABLISHMENT (OFFICES, LABORATORY, STORES)

- These areas should have adequate fire fighting equipment with the relevant signs erected.
- Electrical Compliance Certificates should be obtained from the electrical contractors for the establishment.
- First aid location signs are to be erected indicating where the first aid box is kept.
- A Safety Notice Board is to be erected in a prominent place.
- "Unauthorised Entry" signs to be placed at all entrances.

18.2 STORAGE AND LAY DOWN AREAS

- These areas to be well demarcated and enclosed.
- Areas to be kept neat and tidy at all times.
- If necessary fire fighting equipment with signs to be erected.
- "No Smoking" and "No Naked Flame" signs to be placed at store areas where flammable liquids are stored.

18.3 FIRE PREVENTION AND PROTECTION

- All fire extinguishers should be of a 9KG dry powder type or 9 litres gas cartridge water type (preference must be given to dry powder).
- Fire extinguishers along with the relevant location signs to be erected in and around establishment areas, storage areas, workshop areas, near flammable liquid containers, on certain plant and near concrete batching plants.
- Where possible fire extinguishers should be placed on red and white chevron backgrounds.
- The area below and around fire extinguishers to be kept clear of obstructions at all times.
- All fire fighting equipment must be cleaned regularly and visually inspected on a monthly basis by an appointed person in writing (Refer to Appointments and Registers in this manual).
- All fire fighting equipment must be tested by a competent and authorised organisation on a twelve monthly basis.
- Sub-contractors to provide their own fire fighting equipment.

18.4 USE AND STORAGE OF FLAMMABLE LIQUIDS

- Flammable liquids may not be used or stored in such a manner that a fire or explosion situation develops.
- When large quantities of flammable liquids are to be used or stored then an appropriate flammable liquid store is to be erected (Refer to GSR 4 for specifications).
- Other areas where flammable liquids are used or stored should adhere to the following:
  - must be well ventilated.
  - must only contain one day's supply of flammable liquid.
  - must have suitable fire fighting equipment nearby.
  - must have "No Smoking" and "No Naked Flame" signs erected.
- Where flammable liquids are decanted, metal containers must be bonded and earthed.
- Flammable liquids such as petrol should not be stored in plastic containers but in suitable flame proof containers. (Petrol Jerry Can)
- All diesel tanks must have fire bund walls erected around them, the bund wall must be able to contain 110 % of the volume stored. Fire extinguishers must also be present with the relevant "No Smoking" and "No Naked Flame" signs.
- Employees using flammable liquids should be trained in the safe use of the appropriate liquid.

18.5 EXCAVATIONS

- All excavations deeper than 1.5m must be adequately shored and braced.
- Precautions must be taken to protect surrounding structures.
- Service lines (electric, water and gas) must be identified and made safe before excavating.
- Excavations deeper than 1.5m must have safe access (ladders or ramps) and long excavations should have access points every 50m.
- Excavations must be clearly demarcated and have a physical barricade of 1m high.
- Should excavations pose a danger at night then red flashing warning lights are to be erected.
- Materials must not be packed too close to the edges and cylindrical concrete pipes are to be off loaded with caution and adequate stop blocks provided.
- Vehicles and machinery are to be kept as far back as possible and stop blocks are to be erected for dumpers and concrete trucks discharging concrete.
- All excavations deeper than 1.5m are to be inspected by a competent person designated in writing on a daily basis before work commences (Refer to Appointments and Registers in this manual).

18.6 DEMOLITION

- All service lines to be identified and made safe before demolition commences.
- Structures supporting demolition work may not be overloaded with plant or temporary debris.
- Precautions must be taken to protect workers from a collapse during demolishing operations.
- Precautions must also be taken to protect surrounding structures.
- No person may work under overhanging material which has not been supported.

18.7 WORK IN CONFINED SPACES

In order to understand what a confined space is, one should first look at the definition:

"Confined space" means an enclosed, restricted or limited space in which, because of its construction, location or contents, or any work activity carried on therein, a hazardous substance may accumulate or an oxygen-deficient atmosphere may occur, and includes any chamber, tunnel, pipe, pit, sewer, container, valve, pump, sump, or similar construction, equipment, machinery or object in which a dangerous liquid or a dangerous concentration of gas, vapour, dust or fumes may be present;

Should work need to be carried out in a confined space then the following steps must be taken:

- The internal atmosphere must first be tested by a competent person and declared safe.
- Rescue lines (safety harness) must be attached to the workers.
- There must be safe and easy access in and out of the confined space.
- There must be at least two persons outside monitoring the activity inside the confined space, and both must be trained in rescue and resuscitation methods.
- Under no circumstances may welding or cutting operations be carried out unless all the necessary precautions have been taken.
- Petrol operated machines should never be used in confined spaces as the petrol fumes are heavier than air and accumulate on the bottom surfaces posing explosive and suffocation hazards.
- Workers are not allowed to smoke or start up any naked flame in confined spaces, as flammable gasses may exist.
- Should you be unsure whether a certain area is classified as a confined space or not, then please contact the Safety Department.

- Specialised breathing apparatus is available from the Safety Department.

NOTE: There have even been serious accidents when applying carpet adhesive in cinemas and pumping water out of large chambers with petrol pumps. Dangerous fumes can be generated by paints, adhesives, cleaning solvents, cutting or burning or most plastics and polystyrene.

18.8 ROOF WORK

- An unsafe roof is classified as a roof with a steep pitch or where the material covering the roof will not support the weight of a person.
- Suitable roof ladders, duck boards or crawling boards must be provided when work is carried out on unsafe roofs.
- Workers on unsafe roofs are to be provided with safety belts attached to the structure or a life line.
- When scaffolding needs to be erected on a roof, the roof structure should first be inspected to ensure it's strength.
- On angled roofs scaffold should always be plumb with the horizontals level and the standards placed on suitable boards.

18.9 WELDING, FLAME CUTTING, SOLDERING

- Only trained and authorised persons to carry out these tasks.
- Worker must be equipped with the appropriate protective equipment (gloves, goggles, face shield, apron).
- All cables and electrode holders must be effectively insulated.
- In wet and damp conditions welding equipment and the welder must be properly insulated.
- Special precautions must be taken when welding is carried out in confined spaces.
- Flame cutting equipment (oxygen and acetylene) must have flash back arrestors attached at both the handle ends and the bottle ends.
- Precautions must be taken to control flying slag during operations, especially at elevated heights.
- Protective screens are to be erected in workshop areas.
- Workers assisting in these operations are also to be provided with protective equipment.
- Welding and cutting operations should not take place on any vessel or pipe unless a competent person has certified that there are no dangerous or poisonous substances which may ignite or explode.
- There must always be suitable fire fighting equipment (9Kg fire extinguisher) present during these operations.
- All welding and flame cutting equipment to be inspected every three months (refer to registers).

18.10 GAS BOTTLES

- All gas bottles are to be stored and properly secured (chained) in an upright position.
- With flame cutting operations the oxygen and acetylene bottles are to be secured in a trolley.
- Gas bottles should never be dropped, rolled or bumped.
- Gas bottles should always be stored in well ventilated areas.
- "No Smoking" and "No Naked Flame" signs are to be erected where gas bottles are stored.
- Gas bottles are also to be stored in areas which are protected from the weather elements (especially the sun).
- Gas bottles should only be lifted by a crane in the appropriate lifting trolleys and only after ensuring all valves are properly closed.
- All gas bottles when stored are to be clearly marked which are "Empty" or which are "Full".

18.11 LADDERS

- All ladders are to be constructed of sound material and be of adequate strength.
- Non-slip devices are required at the bottom of the ladder.
- The top section of the ladder must be sufficiently secured to prevent it's displacement.
- The maximum length that a ladder may be is 9m (except for purpose designed extension ladders).
- Ladders may not be joined together.
- Wooden ladders must be constructed of straight grained wood and must be free from defects.
- Wooden ladders may not be painted (only oiled or varnished).
- Ladders with broken or missing rungs may not be used.
- Fixed ladders longer than 5m must be provided with a cage or rest platform and must be fixed 150mm away from the structure.
- When work is carried out from a ladder there must be an additional worker securing the ladder from the bottom.
- Site "homemade" ladders where the rungs are only fastened to the stiles by means of nails or screws are not to be used. (Rungs must be properly let into the stiles).
- All ladders are to be inspected every three months. (Refer to registers).

18.12 RAMPS AND GANGWAYS

- All ramps to be properly constructed and designed with a safety factor of at least two with respect to the load which they may carry.
- Ramps are to be fitted with stepping laths placed at suitable intervals.
- Ramps and gangways higher than 2m must be fitted with guard rails and toe boards.

18.13 SCAFFOLDING

18.13.1 SCAFFOLDING FOUNDATIONS

- All foundations are to be secured and strong enough to support the weight of the scaffold.
- Foundations should always be level and as far as possible kept clear of other building material and rubble.
- Embankments should be cut into to provide level foundations.
- Scaffolding supported over trenches or openings is to be well supported and is to be inspected by a competent person (engineer).
- Adequate sole plates are to be placed on soil foundations with the appropriate base jacks firmly secured to support the scaffolding.

18.13.2 SCAFFOLDING FRAMEWORK

- All scaffold standards must be adequately propped against displacement and secured vertically on firm foundations.
- Standards should not be spaced apart more than 1.8m (heavy), 2m (medium), 2.5m (light) and 3m (very light) respectively.
- Ledgers must not be spaced vertically more than 2.1m apart.
- Scaffolding must be securely and effectively braced to ensure stability in all directions.
- Scaffolding must also be secured to the structure both at suitable vertical and horizontal distances.

- All connections of Kwikstage Scaffolding must be properly connected and secured.
- Ledgers on Kwikstage Scaffolding must be consistent around the scaffold and must be initially placed at the lowest possible connection on the standard.
- The ground standard should always be connected to either a base plate or base jack.
- Base jacks should never be extended to their full length.
- High Load scaffold frames connected on top of each other must have the appropriate connectors with safety pins.
- High Load scaffold frames must also have all cross braces connected properly with the flip lock secured on both sides.

18.13.3 SCAFFOLD BRACING

- The purpose of bracing is to ensure that stability is maintained in all directions.
- Face bracing is diagonal bracing to the longitudinal face of a scaffold to prevent sway.
- Face bracing frequency should not exceed 10 bays.
- Ledger bracing is required to stiffen the scaffold between tie-in levels.
- Ledger braces should be fixed from under the outside ledger of a platform down to the top of the inside ledger.
- Ledger bracing should be placed as close to the standard as possible with a frequency of every 2 bays.
- Plan Bracing is required to prevent the scaffold from twisting.
- Plan braces are positioned from standard to standard diagonally across the width of the scaffold and immediately below the ledges.
- Plan brace frequency should not exceed 10 bays and should also be implemented at tie-in levels.
- Diagonal bracing is required to stabilise large free standing scaffolds.
- Diagonal bracing frequency should not exceed eight bays.
- High Load frame scaffolding is also to be braced in the same manor.

18.13.4 SCAFFOLD TIES

- Ties resist movement both towards and away from structure.
- Ties are to be positioned where the structure is strong enough to resist tie load.
- Ties should be connected to the top of the standards (uprights) and connection to horizontals should be avoided.
- Ties are to be installed with the frequency not exceeding one per 32 Metre Square of scaffolding surface.
- Ties should only be removed under the consistent supervision of the designated scaffold erector appointed in writing.
- High Load frame scaffolding is also to be tied in accordingly.

18.13.5 SCAFFOLD PLATFORMS

- Safe scaffolding platforms must be provided for workers carrying out activities at high levels.
- Wooden scaffold planks must be at least 275mm wide and 38mm thick.
- All wooden scaffold planks must be supported at distances not exceeding 1.25m.
- All wooden boards must be secured by means of wire and clip-on boards must be properly secured.
- All scaffold boards must be placed close together to prevent materials from falling through.

- Toe boards are to be erected on working platforms to prevent materials and tools from being knocked off.
- Handrails (900mm - 1000mm) are to be provided around all sides of any scaffold working platform.
- There should be no gap between the position of the handrail and the last scaffold board.
- Safe access such as ladders or access towers should always be provided for workers gaining access to the working platforms.
- Working platforms should never be overloaded with materials and should be kept as clean as possible.
- Loading platforms or bays are also to have handrails, toe boards, sufficient scaffold boards and additional support underneath the platform.
- Loading platforms or bays must not be overloaded and workers must be made aware of the safe working load.
- Scaffolding platform loadings shall not exceed 320 Kg/m² (heavy), 240 Kg/m² (medium), 160 Kg/m² (light) and 80 Kg/m² (very light) respectively.

18.13.6 MOBILE TOWER SCAFFOLDS

- The height of a tower scaffold should not exceed three times the base width.
- Castor wheels with brake mechanisms are to be used. Brakes are to be locked at all times other than when scaffold is being moved.
- The working platform must have a sufficient number of secured scaffold boards, handrails and toe boards.
- Safe access must be provided to the working platform.
- Under no circumstances may workers move the tower scaffold with other workers still on the platform.

18.13.7 TRESTLE SCAFFOLDS

- Must be soundly constructed of solid material.
- Must have devices to prevent the spreading of the legs.
- May not be higher than 3m.
- Must have no more than two tiers.
- Scaffold boards must be secured to prevent their displacement.

18.13.8 SCAFFOLD - GENERAL

- A competent person is to be designated in writing for the safe erection and dismantling of scaffolding.
- All scaffolding must be erected, altered and dismantled under the direct supervision of the competent person.
- All scaffolding must be inspected weekly and after inclement weather, by the competent person and the findings recorded into a register. (Refer to Appointments and Registers).
- Workers erecting and dismantling scaffolding are to be issued with safety belts.
- Scaffolding sections should not be thrown down but safely lowered down during dismantling operations.
- All workers on scaffolding are to be made aware of the safe working loads along with the Do's and Don'ts of scaffolding, (this includes sub-contractors).(Refer Tool Box Talks - Section 11)
- No damaged scaffolding members are to be used on any scaffold structure.
- When special scaffolds are to be erected it is essential that a competent person (engineer) be consulted.

- The SABS Code Of Practice 085 : " The Design, Erection, Use and Inspection of Access Scaffolding" should also be referred to.

18.14 EXPLOSIVE POWER TOOLS

- The person who is going to operate the explosive tool must be authorised and fully instructed in the safe use of the tool.
- Training for the explosive powered tool is usually given by the supplier or can be given by the Safety Department.
- Explosive powered tools must have a strong guard on the muzzle end which must be able to confine any flying particles or fragments.
- The explosive powered tool must be equipped with a safety device to prevent accidental firing.
- There should also be a built in safety device for the safe removal of misfired cartridges.
- Only the correct size of cartridge should be used and all cartridges including the actual tool should be locked away when not being used.
- The user of the tool must have suitable eye and ear protection.
- As a warning sign is required to be displayed where the tool is being used, it is advisable to erect these signs at the entrance to the site.

18.15 PORTABLE ELECTRICAL EQUIPMENT

- Only an authorised and trained person is allowed to use an electrical tool. These persons are to be shown the full safe operation of the tool before they use it.
- All portable electrical tools must be maintained at all times to prevent an electrical shock to the user.
- These tools are to be inspected every three months on the appropriate register by a designated person appointed in writing (refer to Appointments and Registers).
- All equipment must be fitted with a switch to allow for easy starting and stopping and the tool must be double insulated for electrical shock protection.
- Portable electrical lights are to be fitted with a non-conducting handle and the lamp must have a suitable protective guard.
- Extension cables must be protected at all times especially over access roads and must be fully unwound off the reel before it is used.
- Electrical tools and extension cables must be protected when used in wet or damp conditions.
- Portable electrical tools along with extension cables may only be connected to a power source which has an earth leakage protection device fitted.
- Extension cables and portable lights are also to be inspected on a 3 monthly basis.
- Maintenance and repairs on portable electrical equipment may only be done by a competent person.

18.16 LIFTING MACHINES

- These involve tower cranes, self erecting tower cranes, mobile cranes and overhead gantry cranes.
- Only authorised and trained operators may operate lifting machines. Certificates of the operators must be kept on site.
- All lifting machines must be inspected by a competent person or organisation every twelve months.

- All ropes, chains, hooks, attaching devices, sheaves, brakes, and safety devices which form an integral part of the lifting machine must be examined at six monthly intervals.
- The relevant Plant Department or Hire company can be consulted with regard to the various inspections and tests.
- A copy of the last test inspection of the lifting machine must also be kept on site.
- The maximum load (SWL) must be clearly visible on the lifting machine.
- All cranes are to be fitted with a device to prevent the highest or lowest hoisting position from being exceeded along with a warning device to prevent overloading.
- The cranes must have a brake or safety device capable of containing the maximum load in the event of a power failure.
- Tower Cranes
- Stop blocks must be fitted on all tower crane tracks.
- Ground area around the tower crane base to be sufficiently demarcated and fenced off.
- Danger warning signs to placed near the lower end of the tower crane.
- A small fire extinguisher is to be placed in the cabin of the tower crane.
- Suitable communication (two way radio) to be provided between riggers and operator.
- Mobile Cranes
- Outriggers to be used and placed firmly on support blocks when lifting material.
- It is essential that the mobile crane is level when lifting material.
- Mobile cranes to move around site at safe speeds.
- General Safety
- All lifting hooks are to have a safety latch attached to prevent lifting tackle from slipping out.
- Under no circumstances may any worker be lifted up in any device unless the device (cradle) has been approved by the Department of Labour.
- Where possible, material being lifted must be kept just off the ground and not above workers.
- Trained riggers identified with reflective vests must be provided for lifting operations.
- Material being lowered must be placed down on adequate supports or spacers.
- Cranes to be fitted with warning hooters for operators.
- The area around tower crane bases to be kept clean and free of material at all times.
- Areas where cranes are being used are to be designated as hard hat areas.

18.17 LIFTING TACKLE

- Lifting tackle includes lifting chains, wire rope slings and lifting belts.
- All lifting tackle to have an identification plate clearly showing the serial number and safe working load (SWL).
- All lifting tackle is to be inspected every three months by a competent person designated in writing.
- A copy of the relevant test certificate from the supplier should also be kept on site.
- All lifting tackle is to be stored in a safe manner to protect it from damage and deterioration.
- The correct lifting tackle must be used for the appropriate lifting operation and therefore the shortening of lifting tackle by means of knots is not permissible.
- Lifting tackle may only be used for its designed purpose and may not be altered or misused in anyway.
- Tirfors and lifting gear blocks are also to be inspected every three months.
- All hooks on lifting tackle are to be fitted with safety latches.

18.18 BUILDER'S HOISTS

- The builder's hoist must be erected by a competent person.
- The tower must be sufficiently tied into the structure and adequately braced to prevent movement.
- The tower must have an over travel for the hoist of at least 900mm.
- Each landing place must have a gate of at least 1800mm high and all areas of the hoist must be barricaded to prevent workers from being struck by moving material.

- No person may be transported by the hoist and there must be an effective signalling system in place for the operation.
- The hoist is to be provided with an effective braking system.
- The hoist platform must be constructed so that material will not fall off and the safe working load (SWL) must be clearly identified on the hoist.
- The builders hoist must be inspected by a competent person on a weekly basis and the findings recorded into a register (refer to Registers).

18.19 VESSELS UNDER PRESSURE

- All vessels under pressure must have the manufacturers data plate affixed to the vessel.
- Pressure vessels such as air compressors must have the maximum safe working pressure indicated on the pressure gauge by a red line
- Air compressors are not to be used for blowing dust off clothing and the relevant sign prohibiting this should be displayed on the compressor.
- Connections for compressor hoses must be securely fixed to prevent their undoing and it is advisable to have safety chains attached to both sides of connecting hoses.
- Workers operating with air compressors are to be equipped with suitable eye protection.
- All vessels under pressure (air compressors) must be tested by a competent person or organisation every 36 months and a copy of these certificates are to be kept on site.

18.20 ELECTRICAL DISTRIBUTION BOARDS

- All DB boards are to be painted orange with an electrical hazard sign (MSW7) attached.
- DB boards are to have secure face plates covering wiring and circuit breakers and all DB boards are to be lockable.
- Earth leakage protection devices are to be fitted to all DB boards and tested on a monthly basis.
- Under no circumstances may any worker tamper or attempt to work on an electrical DB board. Only authorised and competent persons are allowed to carry out repairs or maintenance.
- Plugs connected into the power supply must be in a safe condition with no exposed wires and the polarity must be correct.
- All plug sockets must be clearly labelled for their intended purpose and the location of the main power source for that DB board must also be clearly identified.
- As mentioned under Establishment, an electrical compliance certificate must be attained from the electrical contractor who installed the power.

18.21 ENVIRONMENTAL REGULATIONS

- All darkened areas during the construction phase must be sufficiently illuminated, these areas include passageways, staircases, and other areas where there is a lack of natural light.
- A minimum of 20 lux is suitable for general working areas on construction sites.
- Adequate ventilation must be provided for workers carrying out work in closed environments.
- All access areas such as passage ways, staircases, and gangways must be kept free of building materials and other obstructions.
- All floor openings, open sides, drop off areas of buildings, lift shaft openings, etc, must always be sufficiently barricaded and protected to prevent workers from falling from one level to another.
- Chevron (danger) tape is not accepted as a physical barricade and all panels covering floor openings are to be properly secured to prevent their displacement.
- Demarcated areas along with catch nets must be provided when there is a danger of materials or other objects falling onto workers or pedestrians below.

- Secure hoarding must be erected in and around the construction site in order to protect the public.
- Objects and materials may not be thrown from higher levels.
- Regular testing and recording of the information will be carried out on gas emissions and soil contamination as per what is required by the local authorities, consultants and DWAF.

18.22 FACILITIES REGULATIONS

- The site must provide suitable and sufficient sanitation facilities for the workforce.
- Toilet paper, toilet pan seats, towels or hot blowers, and cleaning agents must also be provided.
- If showers are provided then change room facilities must be provided with the appropriate sex indicated on the entrances.
- Separate change rooms must be provided for male and females. (Clearly identified.)
- Change rooms must have adequate seating, have no see through windows, and may not be used for storage areas.
- There must be an adequate supply of drinking water and all water points not fit for human consumption must be clearly identified.
- The site must ensure that all rooms and facilities that are provided are kept clean, hygienic, safe whole and in a leak free condition and are regularly maintained.

18.23 PERSONAL PROTECTIVE EQUIPMENT (PPE)

- PPE refers to hard hats, overalls, safety boots, safety belts, gloves, goggles, dust masks, etc.
- The Act does not prescribe PPE for specific situations, it is therefore the employers responsibility to identify the hazards associated with that type of work and then to take the necessary action.
- The employer must first attempt to eliminate the hazardous situations before issuing PPE.
- PPE must be provided free of charge and workers must be trained in the correct use of the PPE.
- PPE has to be maintained in a good condition and may not be removed from site.
- It is the employer's responsibility to enforce that workers use the PPE issued to them, therefore disciplinary action must be taken against those workers who do not use their PPE.
- It is essential that records are kept of the PPE issued to workers, and workers are to sign for the acceptance of the PPE.
- Recommended protection for certain operations :

  - hard hats, overalls, and protective footwear on all construction sites.
  - eye and hand protection for grinding and cutting operations.
  - eye, ear, and hand protection for concrete breaking operations.
  - face, hand and body protection for welding and flame cutting operations.
  - eye protection when using compressed air machinery.
  - eye and hand protection for concrete work.
  - hand protection for extensive or dangerous manual handling operations.
  - respiratory protection for working with fine dusts, spraying equipment or in confined spaces.

{ TC "SCHEDULE 8

Part 3 : DTI's Construction Requirements"\l 1 }***SCHEDULE 8***

Part 3 : dti's Construction Requirements

1. ENVIRONMENTAL CONTROL & ENERGY MANAGEMENT

The design criteria for the air conditioning and ventilation installations is summarized below:

1.1 DESIGN WEATHER DATA

1.1.1 Location Parameters

The following location parameters will be utilized for calculation of solar heat gains:

Location Pretoria

Altitude 1400m above seal level

Longitude 28.0° East

Latitude 25.4° South

1.1.2 Design Outdoor Temperatures

The air conditioning installation will provide the specified indoor conditions under the following outside temperature extremes:

Summer Maximum 32.3°Cdb/20.4°Cwb

Winter Minimum -1.1°Cdb/-1.7°Cwb

1.2 BUILDING THERMAL DESIGN

1.2.1 Building Thermal Properties

The building thermal design impacts on the initial and running costs of the air conditioning installation and the thermal comfort of the occupants. The following standards will be applied against which the selection of building construction will be measured:

the contribution of the heat load through the facade to the total building sensible heat gain shall not exceed 22W/m² air-conditioned floor area; and

the operating indoor temperature, defined as the average of the air temperature and the mean radiant temperature, will not deviate from the *specified indoor air temperature by 2°C.*

In addition, the above will be measured against the South African Energy and Demand Efficiency Guidelines as follows:

the overall thermal transmission value (OTTV) of the building envelope will not exceed 93W/m²; and

the average heat transmission coefficient (U-value) of the facade will be less that 2.45W/m²K.

To achieve the above tinted glazing with a shading coefficient of maximum 0.6 will be used on the North, East and West facades.

The South and street façade will use single clear glazing throughout the façade

The atriums that are covered to ensure no direct sunlight on the facades will use single clear glazing in the façade. If the atriums are open, tinted glazing will be used.

1.2.2 Roof

A *combination of timber/steel and concrete roof structure is used and will be* insulated with a 25mm layer of insulation similar to ISOBOARD.

1.3 CEILING VOID

1.3.1 *Evaporative Cooling System*

A ceiling void with a minimum depth of 800mm is required to fit the air conditioning ducts, light fittings, electrical and data reticulation, etc.

1.3.2 Individual Street Level Tenancies and Special Areas

A ceiling void with a minimum depth of 400mm is required for ceiling cassette units or 500mm to fit ducted hide away units, light fittings, electrical and data reticulation, etc.

1.4 ENERGY TARGET

The energy cost for the air conditioning installation will be measured against the specified energy targets in the brief.

1.5 COMFORT DESIGN CRITERIA

The air conditioning system will maintain the following indoor comfort conditions if the outside design conditions as listed in 2.1.2 are not exceeded.

DESCRIPTION	GENERAL OFFICE	SPECIAL AREA
Maximum indoor temperature	22°C ±2°C for 2 stage evaporative cooling	22°C ±1.5°C
Relative Humidity	Uncontrolled	Uncontrolled

Minimum indoor temperature	20°C in winter	21°C ±1.5°C
Indoor noise level	NC40-42	NC40-42
Minimum fresh air supply	7.5l/s per person	7.5l/s per person
Filtration - Efficiency - Arrestance	30% 90%	30% 90%

□

The comfort condition fall outside the ASHRAE comfort zone which has become an accepted norm in South Africa for comfort. During extreme weather conditions, which are above the design conditions the comfort temperatures will exceed the indoor design temperature.

1.5.1 Indoor Noise Level

The industry norm for the indoor noise level based on mechanical cooling system with an air supply of ±10l/s/m² is NC 40.

For the evaporative cooling system the air supply on the perimeter offices is ±17l/s/m². The noise criteria for the plate type diffusers are in the region of NC 42. *In the internal areas the noise criteria will reduce to NC 40 due to less air supplied* than on the perimeter offices.

Swirl outlet diffusers will ensure a better air distribution and obtain and a lower noise level due to the improved distribution of the air from the swirl diffusers. A *noise level of NC 38-40 can then be obtained in the office space.*

1.6 VENTILATION STANDARDS

The basement parking, toilets and kitchen areas shall be mechanically ventilated according the National Regulations.

DESCRIPTION	GENERAL OFFICE
Parking (if not naturally ventilated)	7.5l/s per m²
Toilets	10 l/s per m² or 20 l/s per fixture
Tea kitchens	5 l/s per m²
Lift motor rooms	20 l/s per m²
Smoking rooms	40 l/s per m²
Kitchen extract	0.5m/s velocity over the face of the canopy and 85% make-up air.

ON THE ADVICE OF MR. V S BRINK (AUTHOR OF REPORT DCD-4: DOMESTIC WATER AND SEWAGE DRAINAGE) IT WAS DECIDED NOT TO VENTILATE THE TWO SUBSOIL WATER SUMPS. ALTHOUGH THE SUBSOIL SUMPS HAVE ALREADY

BEEN BUILD IT IS POSSIBLE TO ACCOMMODATE A VENTILATION SYSTEM AT A LATER STAGE IF REQUIRED AT AN EXTRA COST.

1.7 INTERNAL DESIGN HEAT LOADS

The following international design heat loads will be used:

ITEM	CRITERIA
LIGHTING General office lighting Special lighting	 11W/m² (+) 1W/m²
OCCUPATION DENSITIES Average over building Average over floor Local (Up to 300m²) Special areas (50m²)	 17m² per person 17m² per person 7m² per person 2m² per person
EQUIPMENT LOADS Average over building Section (225m²) Zone (110m²) Sub-zone (55m²) Module (30m²)	 12W/m² 15W/m² 18W/m² *30W/m² *40W/m²

These loads can be accommodated in the interior zones but not on the perimeter.

The total average heat load of the building may not exceed 51W/m² of air conditioning floor area.

1.8 FLEXIBILITY

A drop-in ceiling of 600 x 1200 is provided with diffusers of 600 x 600. It is thus possible to relocate a diffuser to the optimum position in terms of air distribution when tenant changes take place. The ceiling grid is able to withstand the weight if the diffusers so as to ease relocation.

Provision for thermostats on partitions will have to be provided as and when new cellular offices are constructed.

1.9 ADAPTABILITY

The system will comply with the criteria in the RFQ document provided that these rooms are located in the internal zones.

All spaces with loadings exceeding the above criteria will be treated with a stand-alone mechanical system appropriate to the application. Eg.

close control for IT room.

hide-away split type system for low noise in the Auditorium.

commercial split units for high load areas where close temperature control is not required. Areas in this category is:

Block A – Ground Floor
- Restaurant
- Book Shop
- Retail Shops

Block B – Ground Floor
- Coffee Shop
- Info Shop
- Industry Shop
- Business Centre
- Companies Disclosure

1.10 RELIABILITY

The system typical reliability criteria have been applied in the concept design of the air conditioning system.

In order to meet the design criteria for reliability in critical areas, the air conditioning system serving them must be fed by emergency power.

In addition, N+1 redundancy will be incorporated into the design of the air conditioning system serving the critical areas ie. If normally two units would be required to serve an area, an additional one unit would be installed to provide the necessary backup in the event of failure of a unit.

In sensitive areas, the necessary spares will be kept on site to meet the SLA's for service and maintenance.

N+1 will be provided for the following typical areas:

- *Computer Centre*
- Network Rooms
- PATCH Rooms
- UPS Rooms
- Battery Rooms

1.11 DESCRIPTION OF THE SYSTEM

1.11.1 Basement

The lower basement and a portion of the upper basement will be mechanically ventilated. Air will be mechanically withdrawn from each basement at various shafts positioned in the basements. The air will be discharged outside the building or on the roofs.

1.11.2 BLOCKS A to F

Description Of Air Conditioning Installation To Office Areas

a) Variable Volume Two Stage Evaporative Cooling

Cooling Plant - Multiple double module two stage evaporative coolers with integral cooling towers will be provided on each of the roofs of the buildings. The conditioned air will be ducted into the building from the unit via a vertical service shaft penetrating the floor slabs of the building.

The relief air from the building will be mechanically extracted from relief air shafts via axial fans on the roof.

The primary supply fan and the relief fan will be variable speed and controlled via a static pressure sensor in the supply air duct riser.

Terminal Cooling - The conditioned air from the unit on the roof will be supplied to the office space via variable volume plate ceiling diffusers that is *connected to the duct system in the ceiling void. One evaporative cooling unit will* serve approximately 2,400m² of GLA with an average diffuser layout of ± 1 per 18m².

Terminal Heating - Heating in winter will be by means of electric heater elements located within the diffuser. The heater elements will only operate if heating is required and the VAV diffuser control plate is in its minimum position of ± 30% airflow

Control - The indoor air temperature in areas served by the VAV evaporative cooling system is controlled as follows:

Cooling - The supply air temperature will be controlled by the wet pack pumps and the two secondary fans to maintain a supply air temperature *of ±19°C. The VAV diffusers will modulate the airflow supplied to maintain the set* point on the room thermostat.

Heating - During winter when the ambient temperature is below the supply set point of 19°C the floor air will be returned to the units on the roof and *mixed with the ambient air to achieve the supply air set point. The supply air* temperature set point during winter is kept at 19°C as cooling may be required to internal areas on the floor.

If the room temperature is below the present valve on the room thermostat the diffuser plate will drive close to a minimum position of 30% where after the electric heater in the diffuser will heat the supply air to maintain the required room temperature.

Indoor Temperature Adjustments - The desired indoor air temperature is adjustable by the occupants through a wall – mounted thermostat. One thermostat will be provided per cellular office and 1 per 80m² open plan office. The thermostat will be mounted 1750 mm AFFL against the columns or at the same height as the light switches for the cellular offices.

□

1.11.3 Street

No mechanical cooling or heating system will be provided.

1.11.4 SPECIAL AREAS

(a) *PATCH Rooms, UPS Rooms & Battery Rooms*

Each room requires accurate environmental control of temperature and 24 hours air conditioning by means of a dedicated air conditioning system not connected to the evaporative cooling plant.

The air conditioning installation to these areas will consist of DX type under ceiling split air conditioning units with remote air-cooled condensing units.

A duty standby configuration will be provided to ensure air conditioning available in the event of a unit failure.

(b) Retail Areas

The retail areas will be air conditioned by split type air conditioning units with fresh air mechanically supplied to each unit. No condensate pumps will be used but gravity feed of the condensate where possible.

The following areas fall in this category:

Block A – Ground Floor

Restaurant

Book Shop

Retail Shops

Block B – Ground Floor

Coffee Shop

Info Shop

Industry Shop

Business Centre

Companies Disclosure

Final position of the condensers will be determined in conjunction with the Facility Managers.

Allowance has been made in the structure for ventilation or extract systems in the kitchen in Block A – Ground Floor and the Coffee Shop in Block B – Ground Floor for future enablement.

Dedicated extract systems will be provided for the above kitchens.

(c) Description Of Ventilation System

Basement Ventilation

The basement parking will be naturally ventilated where sufficient cross ventilation can be achieved through outside openings to the basement. Where this is not possible, mechanical ventilation will be provided in accordance with the National Building Regulations.

Other Areas (Toilets, Tea Kitchens, Store Rooms Etc.)

These areas will be mechanically ventilated through ducted exhaust system. The discharged air will be ducted away from the inlet of the evaporative cooling units to prevent the air from being supplied into the building.

1.11.5 ROOF PLANTROOM

Each Office Block will consist of multiple plantrooms for the HVAC equipment. In each plantroom the evaporative cooling unit with accompanying ducting and return/relief air fan will be situated.

The roof plantrooms that overlap the toilet shafts will have the mechanical exhaust system for the toilets.

1.11.6 CONTROLS

(a) Plant

Standalone controllers are provided for the main plant with interface capability to the BMS system for monitoring purposes. The provision of the BMS and the cost for the BMS and monitoring is included in the BMS contract. Refer clause 3.7 for BMS points provided under the HVAC contract.

(b) Tenant Control

a) *Comfort* - High levels of comfort conditions can be achieved in the general areas which is classified as the open plan office area's by providing a thermostat every 80m². Individual temperature control in cellular offices will be provided where the office is closed with walls and have an entrance door.

Uniform temperature distribution is obtained by utilizing swirl-type diffusers.

b) *Air Quality* - A high degree of air quality is achieved as the system consists of full fresh air supply during summer months.

Constant fresh air will be supplied with the minimum of 7.5 l/s/person during the winter months.

The building will be pressurized to limit the amount of dust entering through open windows.

The building can be flushed during the unoccupied times effectively removing odors and contaminants.

1.11.7 Building management system

The BMS will be supplied and installed as part of the Facility Management contract. Points for monitoring the HVAC system will be provided in the electrical boards of the HVAC equipment.

The BMS points that will be provided are summarized below:

(a) Basement Ventilation

Fan on

Fan trip

(b) Evaporative Cooling Plants

Supply fan on

Supply fan trip

Supply air static pressure

Relief air fan on

Relief air fan trip

Relief air static pressure

Cooling water pumps on

Cooling water pumps trip

Secondary fans on

Secondary fans trip

Supply air temperature

Return air temperature

Outside air temperature

1.12 *15 Esselen Street*

15 Esselen Street was omitted from the scope of work and was never evaluated/audited to determine the status of the HVAC systems.

1.12.1 Roofs

Roofs or canopies need not be of the same type on every building, street section or knuckle, possibly for showcasing reasons, and roofs or canopies need not be contiguous with building or street section geometries. Some roofs might be shared.

Cornice lines from building to building need not be consistent, and roof geometries can be varied, and perceived roof heights can step up or down from building to building, or street section to street section.

Individual street and knuckle canopies may be of differing design. Interior Street Canopies need not all be entirely transparent or translucent, glazing where affordable need not be waterproof, but rather be water welcoming.

1.12.2 Facades to Weather

Buildings Facades to be designed as single, all inclusive systems, inside to outside, including windows.

1.12.3 *Facades to Internal Street*

Interior street facades to be designed to be as independent of other shell and core services as possible.

A single building may support more than one interior street façade for branding (e.g. two principal tenants).

Interior street facades may not consist of long balconied walkways that effectively destroy the notion of façade entirely.

The interior street must read as a campus of different buildings not as atrium space only.

Neo Tuscan casino or other theme based approaches will not be acceptable.

1.12.4 *Ventilation*

Ventilation can be naturally induced wherever possible, but in some locations, or in certain event related scenarios, some form of forced air ventilation or air movement may be necessary or at least future enabled, maybe even retro esthetic (like old fashioned ceiling fans). Dependence on stand alone fans is not acceptable in the business unit areas.

Most windows must open, but not all. Windows that open must in appropriate cases be lockable with one or one of only a few keys and have safety latches.

1.13 Lighting performance

Designed lighting effects are of the very essence of the project.

Architectural lighting may be used in lieu of more expensive bricks and mortar architecture as a place making tool.

1.13.1 DTI Site

The site to be lit according to a well thought out master lighting plan that will become part of the urban design guidelines for the site.

1.13.2 Night Lighting

Night lighting of the buildings must take account of the effect of light from within the buildings as well, specifically as might be affected by the impact of window shade states (some open, some closed, some partially).

The night lighting of habitat areas, pathways, trees or shrubs should be provided or enabled, low voltage if wired in support of both wayfinding and security objectives.

After dusk uses of the campus habitat areas should be design anticipated and future enabled.

1.13.3 Campus Buildings & Interior Street

(a) *Fixtures*

Fixtures to be designed to provide fixture lives that do not far exceed the half lives of the embedded lighting technology.

(b) Finishes

The lighting, acoustic and HVAC contribution of any surface, treated or untreated, and any material applied to or placed upon a surface must be considered, including issues of colour, texture, slip resistance, resistance to graffiti, ease of maintenance engineering.

Interior design issues must be subordinate to functionality issues.

The generous use of raw untreated surfaces is encouraged.

(c) Natural Light Sourcing

The Minister's conference room may not be without natural light.

Natural light, if only at one point, for toilet rooms, modesty issues fully addressed is desirable.

The whole of a zone of the interior street need not have a full transparent canopy, even translucent canopy, but the canopies must nevertheless be *designed to admit natural light into the street in a designed manner, if* only from the side.

The effect of both natural and electric light in terms of contrast and glare effects, with specific reference to washout and other effects on computer *monitor image clarity, must be design anticipated in every space where* any kind of image display device will be located (not just computer monitors).

(i) Light Wells

Light wells are acceptable as a means of accessing natural light across otherwise wide floor plates.

The "roofs" of any such wells could be used as placemaking tools.

(ii) Windows

Fewer bigger windows must at least be considered as distinct from knee jerk bands of absolutely regular.

1.14 Acoustics performance

1.14.1 White Noise Systems

Zone controllable white noise, jointly providing or enabling zoned public address, zone specific emergency instructions and two way talk paths for security in *elevators, garages, toilet rooms etc must be provided or fully enabled.*

No Music, dentist's office or elevator music of whatever cultural or non cultural origin allowed.

1.14.2 Furniture & Panel Systems

Furniture and associated panel systems must be chosen with full consideration of sound attenuation and noise transmission characterises taken into account.

1.15 Energy Management

1.15.1 Electric Power

The dti does expect that 15 Esselen and the main campus will be fed by separate feeds and stepdown chambers.

Ground fault protection must be installed with water features and in toilet and other

1.15.2 Alternative Energy Sources

1.16 **Water Issues in Design**

Waterproofing

Water penetration over time should be planned for with provision for collection and channelling for designed reuse or disposal into the storm drain system.

2. **SECURITY**

2.1 *LEVEL 1:Boundary Security*

No electronic site boundary security provided as buildings form boundary.

No external CCTV surveillance provided.

No boundary security will be provided as no boundary fence exist.

2.2 LEVEL 2:Site Security

The Site Security will include the following:

- Internal Street area

- Vehicle entrance from Esselen Street to the Apies River side of Campus

- *No provision was made for external site security or surveillance*

- No provision was made for 15 Esselen or 20 Esselen street

- Vehicle traffic booms with card in/card out at entrances and exits:

(a) 4 x Meintjies Street

(b) 4 x Esselen Street

- *2 x Deliveries*
- 2 x VIP Parking

- CCTV Surveillance on entrance to building

(a) Entry and Exit

(b) One camera at each boom (8 x)

- CCTV cameras and card reader access will be provided in the link to the child care centre

2.3 *LEVEL 3:Basement*

The basement security will include all vehicle and pedestrian entrances to the basement parking area.

- Vehicle traffic booms at entrances and exits. (Traffic booms will be card controlled for employees and pay tickets for visitors)
- No provision for booms or electronic access control was made at gates to VIP parking.
- CCTV Surveillance – In addition to the eight cameras at the entrances/exits, another fourteen cameras will be installed in the basement.
- Lock down facilities – The roller shutter doors will be integrated to be closed from the control room.
- No provision for cameras was made in the lower basement.
-

2.4 LEVEL 4:Internal Street

The Internal Street will entail security in the street area including reception.

- Waist height turnstiles at the main entrance to the mall in Meintjies Street.
- Turnstile/access configuration at the bookshop is to be confirmed by Architect/client.
- CCTV Surveillance – 15 Cameras shall be strategically positioned throughout the public mall area.
- Issuing of access cards to buildings. (The access cards will be supplemented with photo and electronic signature id's).
- X – ray machine at the main reception for parcels / handbags
- Implementation of walk through metal detectors are to be confirmed by Architect/client.
- No provision was made for asset tracking field devices or software.
- No provision was made for time and attendance management.

2.5 LEVEL 5:Building Security

The Building Security will include all access to the various buildings that will include parking to the minister's area.

- Physical security by DTI at building entrance
- All doors will be monitored – Fire access to all lift lobbies and stair cases. Card access required to access office areas.
- CCTV Surveillance at all entrances and exits – Cameras are fitted on the secure side of all access doors.
-

2.6 LEVEL 6:Access to Offices

The access to offices will entail all entrances to office space in a building.

- Card in/card out systems to be fitted to all doors allowing access to office areas. Card swallowers to be installed at all exit doors. Reception areas shall have intercom *systems with manual opening facilities.*
- Door Monitoring System
- CCTV Surveillance – one camera at each access door.

2.7 LEVEL 7:Minister's Offices

The security to the Minister's offices will entail all entrances and exits to the Minister's offices.

- Access control on all doors
- Door Monitoring
- *CCTV Surveillance – at entrance and an additional four cameras strategically* positioned.
- An additional quad monitor will be situated in the body guard office.
- *Additional remote panic buttons as well as under desk panic bars will be installed.*
- Video intercom at reception and between minister reception and body guard office.

2.8 Reception

A main reception area will be provided at the main entrance in Meintjies Street. A possible Satellite Reception will be provided at the Meintjies / Esselen Streets entrance to direct

visitors to the main reception and provide physical surveillance at this entrance to the Campus.

All visitors will have to report to reception to gain access to the office buildings. Visitors will be provided with an electronic access card to a building linked to specific floor access. The visitor's card will include a photo and electronic signature of the visitor.

The visitor's access card will be "swallowed on exit " from a building. The visitor's card will also only be valid for one day.

VIP or pre-announced visitors will be accommodated at an express lane at reception.

3. CLEANING & HYGEINE SERVICES

Ideally ducting would be visible, acessible, easily accessible for frequent inspection.

Mail handling room or rooms must be designed to contain airborne biohazards and protect workers.

Asbestos containing materials may not be introduced to the campus in any form.

4. HABITAT MANAGEMENT

Internal plants in pots, beds or water features are required.

5. WASTE MANAGEMENT & RECYCLING

5.1 Sewerage

Statutory and regulatory requirements.

5.2 Storm Water

Discharge points into Apies aesthetically designed, placed in consideration of Apies promenade user sensibilities; anticipate flash flood, 100 year flood backwash conditions

6. GARAGE & BASEMENT LEVEL SERVICES

As proposed by bidder.

Among the services to be located at basement level areplant rooms (in lowest basement), maintenance and churn support rooms, dti business unit secure storage, mailing handling, goods receipt and dispatch, VIP driver and security staff hospitality facilities, support staff changing rooms, SMME facilities.

With respect to parking the fundamental requirement is sub-surface parking of 2.5 bays or spaces for each 100 square meters of developed space, full build out under bidder's required *full build out proposal.*

Garage design should anticipate designation of a peak hour fast lane in (am), fast lane out (pm), so that dti staff and other campus residents do not wait for casual visitors.

Garage design must anticipate and cost effectively enable use by bicyclists and motor cyclists (these in designed areas) No motorcycles taking up an entire auto parking bay.

6.1 Garage/Basement

Carwash & Detailing Service

Fixed location(s) at garage level

Must be provided on a designed in advance for basis, commercial basis on demand.

6.2 Interstitial Space

In soffit space produced by a higher slab to slab height in the garage/basement(s), the following services, among any number of others to be future enabled, would be horizontally *linked to vertical interstitial space rising to the floors above:Power; data and telephony, air to* air, blue tooth and cellular support; drainage; fire water, water supply; storm water; gas; ventilation.

Basement heights would accommodate fall for piped services.

Garage floor slabs need not be plumb.

7. FOOD SERVICE & CATERING

7.1 Campus Wide Catering

Adequate provision to be made for food prep, serving support, bar support, tray and sit down serving, clean up, ice making, cold storage to the extent required, catering staff logistics solutions..

Third Party Commercial Tenants Functions in the Internal Street

Fully design enabled.

7.2 Vending Machines

Vending machines to be kept to a minimum to encourage staff to use vendors in the interior street, SMME entrepreneurs among these.

Pause areas might have a vending machine.

7.3 **Dep Minister DG & VIP Catering**

Fully design enabled

The VIP Suite/Precinct must have an 18 seater dining room with prep kitchen and bar.

The waiting areas associated each of the Minister's, Deputy Minister's and Director General's suites must be combined with, adjacent to the suite pause area.

8. **CURATORIAL & EXHIBIT MANAGEMENT SERVICES (This service is not to be provided by Rainprop !)**

8.1 **Interior Street Art & Public Art & Sculpture Gallery**

All or selected street zones, knuckles must design enable both permanent and non permanent art display opportunities.

8.2 **Locations for Memorials & Sculpture**

Must be design enabled. Some must be night lightable.

Madiba Memorial Statue - A suitable place and base for an existing life size statue, night lit, must be provided .

African Footprints - Must be design enabled.]

9. **EVENT, FUNCTION & PERFORMANCE MANAGEMENT**

Street Zone Functions

Toileting Support - Provision must be made to redesignate, ad hoc, selected mens toilets as womens toilets, provide portable toilets in a tasteful if not actually elegant manner at garage level.

Catering & Performance Support - Must be design enabled.

10. **CONFERENCING & MEETINGS SUPPORT (This service is not to be provided by Rainprop !)**

Meetings - Audio Visual and other Support

All necessary support to ensure successful meetings in a manner that exceeds the usual standard practice.

11. **AVAILABILITY & OCCUPANCY MANAGEMENT**

Tenant fit out

Space Planning - Must be part of the CAFM system.

12. ***VERTICAL TRANSPORTATION***

Methodology used for the selection of elevators is based on cost and effectiveness over the entire 25-year period with the emphasis, placed on the principle of the encouragement the use of stairs to alleviate elevator groups from the high levels of interfloor traffic.

The handling capacity of the lifts is between (16.1 – 48%/5 min with the intervals between 34.7 – 81.2). Handling capacity is within the parameters but not the intervals, which will relate to long waiting periods. With the long waiting time a percentage of the occupancy that wants access to first floor and upper basement will start using the stairs which will ensure that DTI's objectives are met.

12.1 Description of the works

Building	**Type of Lift**	**Lift *Number***	**No *Lifts***	**Stops**	**Weight**	**Internal Size's (D x W x H) mm**
Building A	Passenger	M1	1	5	1275 kg	2000 x 1400 x 2200
	Passenger	P1	2	4	900 kg	1100 x 1400 x 2200
	Goods	S1	1	5	1000 kg	1100 x 2100x 2750
	Hoist	H1	1	2	600 kg	1000 x 1000 x 1500
Building B	Passenger	P2	1	4	1000 kg	1100 x 2100 x 2200
	Goods	S2	1	5	1275 kg	2000 x 1400 x 2750
Building C	Passenger /Goods	P3	1	5	1000 kg	1100 x 2100 x 2750
Building D	Passenger	P4	1	4	630 kg	1100 x 1400 x 2200
	Goods	S3	1	*5*	*1000 kg*	*1100 x 2100 x 2750*
Building E	Passenger	P5	1	4	630 kg	1100 x 1400x 2200
	Goods	S4	1	*5*	*1000 kg*	*1100 x 2100x 2750*

Building F	Passenger	P5	1	4	1000 kg	1100 x 2100x 2200
	Goods	S5	1	5	1000 kg	1100 x 2100 x 2750

Escalators

Building	**Escalator Number**	**No of Escalators**
Parking Garage	*E1 & E2*	*4*

12.2 Design criteria for the vertical transport

The following factors has been used as a basis for the assessment:

- 1 person per 17-m² net office spaces
- Percentage persons in the building, which should be transported within five minutes (*PQ5 16 – 25 %*) for buildings with peak diverging traffic, buildings occupied by one company with uniform working hours.
- Number of floors for passenger lifts per building is four (Ground, 1 to 3).
- *Number of floors for goods lifts per building is five (Upper basement, Ground and 1 to* 3).
- Average distance between floors 3.5 meter
- *Door opening time 2,4 seconds*
- Door closing time 1,2 seconds.
- Carload factors 80% of the rated load.
- *Lifts rated speed 1 m/s and the acceleration 1m/s²*
- Escalators speed 0,5 m/s

12.3 Population figure's used to calculated the required elevators

Building A	*550*
Building B	350
Building C	200
Building D	200
Building E	200
Building F	350
Basement up to street level	648

Office blocks

Although the buildings consist of four-floor only three floors for the passenger and four floors for the goods lifts are consider with the traffic analysis. During peak traffic we assume that ⅓ of the total occupancy using the lifts will use the goods lifts to get access to the basement or the opposite.

Upper and Lower Basement

The basement consist of 1 195 parking spaces. With ⅓ of the occupancy from floor 1 to 3 using the lifts, we of the opinion that only 660 will use the lifts for access from the street level to Upper & Lower basement or the opposite.

12.4 Specifications

Escalator details

No of Escalators	Four (4)
Capacity	9400/hour
Speed	0.5 m/s
Step With	1000 mm
Level Steps, Upper End	2 Horizontal
Level Step, Lower End	2 Horizontal
Balustrades	10 mm glass
Handrail	Black endless
Skirts Material	Sheet metal skirting with black anti-friction coating
Step Colour	Silver aluminium
Decks	*Natural anodised aluminium* decks
Side Cladding	Primed, commercially flat sheet steel side cladding
Soffit Cladding	Primed, commercially flat sheet steel soffit
Access Cover	Ribbed aluminium
Comb Segment Material	Aluminium comb segment
Key Switch Location	Key start switch, end on right
Step Demarcation Light	None
Step Demarcation	Grooved demarcation line on step

Lift details

	Passenger lifts	**Service lifts**
TYPE (Each lift)	Passenger/stretcher	Passenger/good/ stretcher

LOAD (Each lift)	630 - 1275 kg/8 - 17 persons	1000 - 1275 kg/13 - 17 persons
SPEED (Each lift)-	1.0 m/s	1.0 m/s
Stops	4 with one 5 stop (the ministers lift)	5
Car (Each Lift)		
No of openings	One	One
Front walls	Brushed stainless steel	Brushed stainless steel
Side walls	Brushed stainless steel	Brushed stainless steel
Rear walls	Brushed stainless steel	Brushed stainless steel
Ceiling	Partial oval stainless steel	Partial oval stainless steel
Light fittings	Direct fluorescent	Direct fluorescent
Floor finish	Rubber	Rubber
Mirror	Partial height, full width on rear wall	None
Hand rail	Brushed stainless steel on three walls	Brushed stainless steel on three walls
Canvas protection sheets	Provision will be made to hang protection sheets on three of the walls when transporting goods in lift. The lift contractor will provide the removable sheets.	Provision will be made to hang protection sheets on three of the walls when transporting goods in lift. The lift contractor will provide the removable sheets.
Car Internal Minimum height	2200 mm	2750 mm
Car Doors		

Type	Automatic two panel centre opening	Automatic two panel centre opening
Clear width and height	900mm x 2100 mm for cars 630 - 1000 kg	900mm x 2100 mm for cars 1000 kg and 1200 x 2100 mm for the car 1275 kg
Finish	Brushed stainless steel	Brushed stainless steel
Safety devices	Memco curtain of light	Memco curtain of light
LANDING DOORS		
Type	Automatic two panel centre opening	Automatic two panel centre opening
Clear width and height	900mm x 2100 mm for cars 630 - 1000 kg	900mm x 2100 mm for cars 1000 kg and 1200 x 2100 mm for the car 1275 kg
Finish	Brushed stainless steel	Brushed stainless steel
Safety devices	Electromechanical locks and contacts	Electromechanical locks and contacts
CONTROL SYSTEMS		
	Duplex full collective with LCE *microprocessor* controllers	Duplex full collective with LCE *microprocessor* controllers
	Fire service as required by the *Occupational Health* and Safety Act	Fire service as required by the *Occupational Health* and Safety Act

	Remote monitoring of the lifts will be *provided by the* provision of a minimum of 12 signals. The signals will be incorporated *into a proprietary* system. The signals will be made available in the form of potential free *contacts*	Remote monitoring of the lifts will be *provided by the* provision of a minimum of 12 signals. The signals will be incorporated *into a proprietary* system. The signals will be made available in the form of potential free contacts
Signali-sation		
Car operating panels	*Stainless steel with* Braille micro stroke buttons with call accepts lights, door open, alarm, fan, *emergency light and* 7-segment position indicator.	*Stainless steel with* Braille micro stroke buttons with call accepts lights, door open, alarm, fan, *emergency light*, 7-segment position indicator and voice annunciating.
Landings	Stainless steel with Braille micro stroke buttons with call accepts lights on each floor. Seven segment position indicator with directional arrows and pre- announcing arrival gong on lower ground floor. Directional arrows and arrival gongs on all other floors.	Stainless steel with Braille micro stroke buttons with call accepts lights on each floor. Seven segment position indicator with directional arrows, and pre- announcing arrival gong on lower ground floor. Directional arrows and arrival gongs on all other floors and voice annunciating for direction.

Intercom system	Intercom system will be provided in each car and will be connected to the security/control station by lift contractor.	Intercom system will be provided in each car and will be connected to the security/control station by lift contractor.

DRIVE SYSTEMS

Drive type	V3F – variable voltage variable frequency gear less machine	V3F – variable voltage variable frequency gear less machine
Power supply	380V/220V 50 Hz	380V/220V 50 Hz
Location	In shaft, controller at top	In shaft, controller at top
Shaft		
Material	Concrete & Brick	Concrete & Brick
Width x depth	Refer to drawings for the lift shaft size	Refer to drawings for the lift shaft size
Pit	1450 - 1600 mm	1450 - 1600 mm
Headroom	3700 mm	3700 mm
Shaft lighting	Minimum of 50 lux	Minimum of 50 lux
Three point plugs	Top and bottom of shaft	Top and bottom of shaft

Intercoms

All the lifts will be provided with an intercom system. The systems will be connected to the security/control station. Location not yet established, establishment will be part of the detail design.

Standby power

With reference to the NBR 0400 is a requirement that any building, which consist of three levels, must be equip with a stretcher lift and only if the building exceeds 30 meters in height *the power supply to the motor operating such stretcher lift shall be protected against the*

effect of the fire for at least 120 minutes. Refer to rule TT48 of the National Building Regulation SABS0400.

Soft ware

Microprocessor control

The electronic equipment will be of a modular construction consisting of slide in printed circuit (PC) boards that have simple plug in connections and mountings that facilitate easy insertion or withdrawal of the card. The PC board will be properly protected against dust and dampness and provision will be allowed for mounting the card inside the control panel. The cards will be equipped with accessible diagnostic test points for service, maintenance and fault finding. The control panels will be mechanically mounted in a way that eliminates vibration. All terminals of the control equipment will be clearly marked and/or numbered. These markings will be in accordance with the drawings, which are issued with the equipment. The control system will be a simplex full collective type.

The company makes currently use of the Tridium Niagra systems and the lift systems must be able to communicate with the Tridium Niagra system by means of the following protocols namely Bacnet, Lon works or Modbus. The Tridium Platform will view all conditions and alarms of the lift systems. All controls and alarms of the lift systems will therefore be integrated into the BMS and outputs form BMS must make use of the protocols namely Bacnet or Lon works.

The contractor will supply and install all components, equipment, interconnections and other item necessary for the successful interfacing of the control systems and motors.

Operation of the control system

To ensure optimum performance the control panel inside every lift car will give direct commands to the control system.

The control system for the passenger/goods lifts (group control – simplex full collective) will ensure that one of the lifts returns to the main landing and the other lifts returns to the last reserved landings. Calls will be answered by the lift nearest to the call as well as the additional calls in the direction of movement.

The lift speed will be maintained under varying load conditions. (Changes in speed will be considered if information on the speed variations is clearly documented in a covering letter)

The lift control systems for the passenger/goods lifts will be capable of bringing the lifts to a standstill at the landings with a tolerance of "2" mm with reference to the floor level of the lift car and the landing.

Each lift will operate independent in case of failure of the other one.

The lift control panel will convey signals that are issued by the passengers to the controller.

The car control panels will be supplied with a digital floor indicator.

The control panel will be vandal tamper and each button is to be internally illuminated when it is activated.

The following will be incorporated into the lift car control panel:

a) an alarm button and intercom system extended to the security room

b) *door open button*

c) door close button

d) fireman override switch

e) key-switch for car light

f) key-switch for attendant control

g) direction arrows

h) position digital indicators

i) fan key switch

floor level buttons

open, close direction, floor level buttons will be voice annunciating with Braille micro stroke buttons

Compliance & Standards adhere to

The installation will comply with the latest revision and amendments of the regulations, as stipulated below:

- SABS 1545-1/2/10: 1999 Specification for lifts and service lifts.
- *SABS 1543: 1999 Specification for escalators and passenger conveyors.*
- Code of Practice for wiring of premises - SABS-0142.
- Occupational Health and Safety Act, Act 85 of 1993. (OHS. act)
- *Mines and Work Regulations Government Notice R 1609 of 28 September 1962, as* amended.
- National Building regulations. SABS Code 0400.
- *Local municipal byelaws and regulations as well as regulations of the local electrical supply* authority.

12.5 Escalators

No escalator may rise more than a half slab.

Any escalator must be complemented by and subordinate to a more inviting set of stairs, maybe also ramps, but in any case the issues of handicapped access must be solved. Any associated stair must not be uncomfortably steep just to correspond to the rise/run spec of the escalator, which should also be no steeper than technically necessary.

12.6 Stairs

All stairs must have generous landings, gentler slopes, be absolutely non slip in all circumstances, low maintenance, not painted white without motivation, must clearly be more available than elevators and be equally gracious, if spare, and inviting.

The closest vertical transport option for everyone should be a very pleasant and functional stair.

Stairs cannot be opulent. Some might constitute showcasing opportunities.

To Weather - ideally such stairs could double as fire stairs, might also provide smoker refuge and relief stations with built in butt cans at landing level.

To Interior Street - must have generous multi use landings at half slab.

15 Esselen Street - The main stair banister heights may have to be raised to get certification.

12.7 Dumb Waiters & Hoists

Dumb waiters are discouraged.

12.8 Bridges

The designs of all bridges must anticipate both dti security and public safety issues.

12.9 Handicapped Access

At a minimum the campus facilities must meet statutory, and constitutional guarantees regarding access.

Control pads, as in elevators, even to the extent of a second control panel, must be accessible to persons seated in wheel chairs who may additionally have dexterity handicaps, *but must not be so low as to require standing persons to stoop for access.*

The elevator doors must be designed not to harm the handicapped or children on closing.

Seeing eye dogs must be catered for (but must also pass security) and some way for affected persons to relieve their dogs during the day, on or near campus, in the precinct, must be design anticipated.

13. **MATRIX MANAGEMENT (CEDO, Chief Experience Delivery Officer)**

South African Showcasing - Permanent Trade & Industry Exhibit

Locations in the internal street must be future enabled to hold possible heavy and unweildy items for exhibit, future enabled opportunities to suspend items from above.

{ TC "SCHEDULE 8

Part 6 : Room data sheets"\l 1 }**SCHEDULE 8**

Part 6 : Room data sheets

This schedule details the process to be followed in compiling the room data sheets.

1. The Concessionaire shall compile a room data sheet for each Zone (as defined in the Experience Delivery Standards and Payment Mechanism).

2. Each room data sheet will record:

2.1 the as-built specifications of; and

2.2 the Services to be provided in respect of,

the Zone to which the room data sheet relates.

3. In compiling the room data sheets the Concessionaire shall have reference to the Experience Delivery Matrix, the Concessionaire's Proposals, the Method Statements and the dti's Construction Requirements.

4. The Concessionaire shall procure that:

4.1 the DC Contractor provides electronic architectural drawings in a standard exchange format to the FM Contractor, as soon as can reasonably be prepared. These drawings will spatially define the Zones and will depict a visual layout of each Zone;

4.2 the DC Contractor and the FM Contractor provide attribute data for every Zone;

4.3 the FM Contractor will use the drawings referred to in clause 4.1 and the attributable information referred to in paragraph 4.2 to establish a geographical-based information system (the "GIS");

4.4 the FM Contractor uses the GIS to produce the room data sheets and to operate the Experience Delivery Matrix (as defined in the Experience Delivery Standards and Payment Mechanism);

4.5 the room data sheets are presented to the dti as and when such are available but in any event no later than the date specified for this purpose in the Programme.

5. The GIS software to be used for the purposes of the room data sheets shall be as agreed between the Concessionaire and the **dti**. Should the Concessionaire and the **dti** fail to reach agreement on such within 20 days after the Execution Date, the matter shall be referred to Fast Track Dispute Resolution for determination.

6. The room data sheets will be made available to the Independent Tester in a format that will enable the Independent Tester to check off the specifications stated in the room data sheet against his inspection of each Zone.